

CLAIMS

1. A sprinkler, comprising:
an outer housing having a lower end connectable to a source of pressurized water;
a riser vertically reciprocable along a vertical axis within the outer housing between extended
and retracted positions when the source of pressurized water is turned ON and OFF;
a nozzle mounted at an upper end of the riser for rotation about the vertical axis;
a turbine mounted for rotation inside the riser; and
a drive mechanism mounted within the riser and connecting the turbine to the nozzle so that
when the source of pressurized water is turned ON the resulting rotation of the turbine by the
pressurized water will rotate the nozzle, the drive mechanism including a reversing mechanism for
causing the nozzle to rotate between a pair of arc limits, the reversing mechanism including a common
rotatable driving member drivingly connected to the turbine through a gear train reduction, the
driving member being capable of driving a pair of spaced apart driven members in opposite rotational
directions, a sliding clutch positioned between the upper and lower driven members and reciprocable
along a central drive shaft but rotatably coupled thereto, and a clutch moving member for
reciprocating the clutch along the drive shaft to selectively positively engage the clutch with one or
the other of the driven members.

2. The sprinkler of Claim 1 and further comprising a mechanism that allows a least one
of the arc limits to be adjusted.

3. The sprinkler of Claim 1 and further comprising an over-center mechanism for shifting
the reversing mechanism.

4. The sprinkler of Claim 3 wherein the clutch reciprocating member is a yoke linked to
the over-center mechanism.

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5. The sprinkler of Claim 1 wherein the clutch has radially extending teeth formed on upper and lower sides thereof that selectively engage with radially extending teeth on opposing sides of the driven members.

6. The sprinkler of Claim 1 wherein the common rotatable driving member comprises a central bevel pinion gear.

7. The sprinkler of Claim 6 wherein the driven members are each comprise a bevel gear that meshes with the central bevel pinion gear.

8. The sprinkler of Claim 1 wherein the clutch is splined to the drive shaft.

9. The sprinkler of Claim 1 wherein the nozzle is mounted in a turret and a turret coupling assembly connects an end of the drive shaft to the turret.

10. The sprinkler of Claim 7 wherein the one of the upper and lower bevel gears that is not engaged by the clutch is free to rotate about the drive shaft in a direction opposite to a direction of rotation of the drive shaft.

11. A sprinkler, comprising:
an outer housing having a lower end connectable to a source of pressurized water;
a riser vertically reciprocable along a vertical axis within the outer housing between extended and retracted positions when the source of pressurized water is turned ON and OFF;
a nozzle mounted at an upper end of the riser for rotation about the vertical axis;
a turbine mounted for rotation inside the riser; and
a drive mechanism mounted within the riser and connecting the turbine to the nozzle so that when the source of pressurized water is turned ON the resulting rotation of the turbine by the pressurized water will rotate the nozzle, the drive mechanism including a reversing mechanism for causing the nozzle to rotate between a pair of arc limits, the reversing mechanism including a central

bevel pinion gear drivingly connected to the turbine through a gear train reduction, the central bevel
pinion gear being capable of driving a pair of spaced apart upper and lower bevel gears in opposite
rotational directions, a sliding clutch positioned between the upper and lower bevel gears and
vertically reciprocable along a central drive shaft but rotatably coupled thereto, and means for
vertically reciprocating the clutch along the drive shaft to selectively positively engage the clutch with
one or the other of the upper and lower bevel gears.

12. The sprinkler of Claim 11 and further comprising a mechanism that allows a least one
of the arc limits to be adjusted.

13. The sprinkler of Claim 11 and further comprising an over-center mechanism for
shifting the reversing mechanism.

14. The sprinkler of Claim 13 wherein the clutch reciprocating means includes a yoke
vertically movable by the over-center mechanism.

15. The sprinkler of Claim 11 wherein the clutch has radially extending teeth formed on
upper and lower sides thereof that selectively engage with radially extending teeth on opposing sides
of the upper and lower bevel gears.

16. The sprinkler of Claim 11 wherein the turbine rotates about a horizontal axis and the
gear train reduction includes a plurality of gears that rotate about a plurality of corresponding
horizontal axes.

17. The sprinkler of Claim 11 wherein the clutch is splined to the drive shaft.

18. The sprinkler of Claim 11 wherein the nozzle is mounted in a turret and a turret
coupling assembly connects an end of the drive shaft to the turret.

19. The sprinkler of Claim 11 wherein the one of the upper and lower bevel gears that is not engaged by the clutch is free to rotate about the drive shaft in a direction opposite to a direction of rotation of the drive shaft.

20. A sprinkler, comprising:

- an outer housing having a lower end connectable to a source of pressurized water;
- a riser vertically reciprocable along a vertical axis within the outer housing between extended and retracted positions when the source of pressurized water is turned ON and OFF;
- a nozzle mounted in a turret positioned at an upper end of the riser for rotation about the vertical axis;
- a turbine mounted for rotation about a horizontal axis inside the riser;
- a drive mechanism mounted within the riser and connecting the turbine to the nozzle so that when the source of pressurized water is turned ON the resulting rotation of the turbine by the pressurized water will rotate the nozzle, the drive mechanism including a reversing mechanism for causing the nozzle to rotate between a pair of arc limits, the reversing mechanism including a central bevel pinion gear drivingly connected to the turbine through a gear train reduction, the gear train reduction including a plurality of gears that rotate about a plurality of corresponding horizontal axes, the central bevel pinion gear being capable of driving a pair of spaced apart upper and lower bevel gears in opposite rotational directions, a sliding clutch positioned between the upper and lower bevel gears and vertically reciprocable along a central drive shaft and splined to the drive shaft, and a yoke capable having a first end coupled to the clutch for vertically reciprocating the clutch along the drive shaft to selectively positively engage the clutch with one or the other of the upper and lower bevel gears, the clutch having radially extending teeth formed on upper and lower sides thereof that selectively engage with radially extending teeth on opposing sides of the upper and lower bevel gears, the one of the upper and lower bevel gears that is not engaged by the clutch being free to rotate about the drive shaft in a direction opposite to a direction of rotation of the drive shaft;
- a turret coupling assembly connecting an upper end of the drive shaft to the turret;
- an over-center mechanism connected to a second end of the yoke for shifting the reversing mechanism; and

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a mechanism that allows a least one of the arc limits to be adjusted.

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21. A reversing mechanism for connecting a turbine in a sprinkler to a rotatable nozzle, comprising:

a drive shaft;

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a pair of spaced apart driven members mounted on the drive shaft;

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a common rotatable driving member drivably connectable to a turbine, the driving member capable of engaging the pair of spaced apart driven members so that rotation of the driving member will rotate the driven members in opposite rotational directions around the drive shaft,

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a sliding clutch mounted on the drive shaft between the upper and lower driven members and reciprocable along the drive shaft but rotatably coupled thereto; and

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a clutch moving member having one end engaged with the clutch for reciprocating the clutch along the drive shaft to selectively positively engage the clutch with one or the other of the driven members.

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22. The reversing mechanism of Claim 21 wherein the clutch has radially extending teeth formed on upper and lower sides thereof that selectively engage with radially extending teeth on opposing sides of the driven members.

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23. The reversing mechanism of Claim 21 wherein the common rotatable driving member comprises a central bevel pinion gear.

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24. The reversing mechanism of Claim 23 wherein the driven members are each comprise a bevel gear that meshes with the central bevel pinion gear.

25. The reversing mechanism of Claim 24 wherein the clutch is splined to the drive shaft.